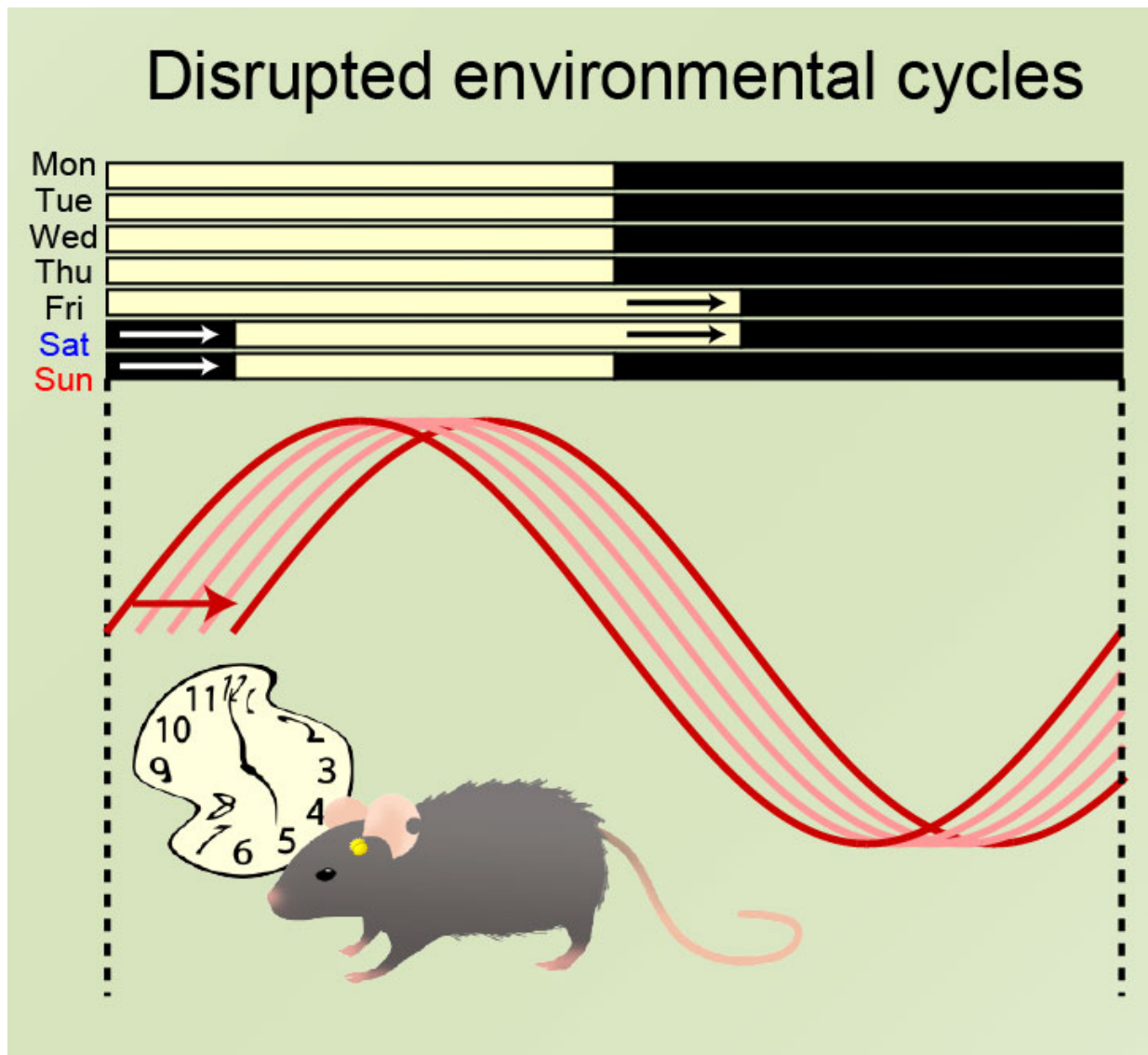


# Altering daily light-dark cycles affects fertility in middle-aged female mice

August 20 2015



An artistic interpretation of how weekly perturbation of the light-dark cycle

disrupts estrous cycles in middle-aged female mice. Credit: Takasu et al./*Cell Reports* 2015

The fertility cycle in mammalian females becomes more irregular during the transition to menopause. The aging of the circadian clock may be a main driver of this change, argues a study published August 20 in *Cell Reports*. Researchers in the United States and Japan found that fertility in middle-aged mice could be improved or reduced according to differences in the light-dark cycle, whereas younger mice were unaffected.

Many of the body's processes follow a natural daily rhythm, or so-called [circadian clock](#), that is based on 24-hour day-night cycles. Previous research has shown that the menstrual cycle in female mammals is affected by the region of the brain, called the suprachiasmatic nucleus (SCN), that controls the circadian clock. Because of this link, research collaborators in Japan and the United States investigated the relationship between the circadian clock and age-related changes in [reproductive function](#).

The investigators found that genetic or environmental manipulations that altered the SCN timing signal and disrupted the [circadian rhythms](#) of young female mice did not affect reproductive cycling and function, whereas the same conditions led to infertility in older female mice. "Importantly, changing the environmental conditions by matching the periodicity of the light cycle to the altered periodicity of the SCN could restore reproductive function in the older females," said senior author Wataru Nakamura, of Osaka University and the Japan Science and Technology Agency.

The results indicate that, although aging mammals are susceptible to

reproductive dysfunction when changes occur in SCN signaling and the circadian clock, these effects might be reversed. While corresponding studies are needed in humans, the findings suggest that ensuring harmony between internal and environmental rhythms may help improve fertility.

"In modern society, females are exposed to many challenging perturbations in the environment that might play a role in fertility difficulties—we now live with high light levels in the evening, and our sleep cycle is disrupted by shift work or crossing time zones," said co-author Gene Block, of the University of California Los Angeles. "The ability to rescue reproductive function by altering the light schedule in a rodent model suggests that improvements in 'circadian hygiene'—for example, reductions in evening illumination, more regular meal timing, or avoiding rotating shiftwork or schedules that lead to irregular sleep—may all be important remedies for reproductive difficulty."

**More information:** *Cell Reports*, Takasu et al.: "Recovery from Age-Related Infertility under Environmental Light-Dark Cycles Adjusted to the Intrinsic Circadian Period" [dx.doi.org/10.1016/j.celrep.2015.07.049](https://doi.org/10.1016/j.celrep.2015.07.049)

Provided by Cell Press

Citation: Altering daily light-dark cycles affects fertility in middle-aged female mice (2015, August 20) retrieved 9 April 2024 from <https://medicalxpress.com/news/2015-08-daily-light-dark-affects-fertility-middle-aged.html>

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